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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,215	03/25/2004	Mikiya Uchida	10873.1371US01	6568

23552 7590 12/15/2004

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EXAMINER	
VU, HUNG K	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 12/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/809,215	UCHIDA ET AL.	
	Examiner	Art Unit	
	Hung Vu	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) *10-13* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5 and 9* is/are rejected.

7)☒ Claim(s) *2-4 and 6-8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *03/25/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Invention of Group I, Claims 1-9, in the reply filed on 09/24/04 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Applicant's election without traverse of Invention of Group I, Claims 1-9 in the reply filed on 09/24/04 is acknowledged.

Claims 10-13 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 09/24/04.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

3. The disclosure is objected to because of the following informalities: On page 8, lines 28 and 30, "the floating diffusion layer 4" should be changed to "the floating diffusion layer 1" for clarity.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 5 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art of Figures 13-19 in view of Song et al. (US 2003/0234432). Applicants' Admitted Prior Art of Figures 13-19 disclose a solid-state imaging apparatus, comprising:

a plurality of photosensitive cells (98) disposed in a matrix in a photosensitive region on a semiconductor substrate (9);

a driving unit for driving the plurality of photosensitie cells,

wherein each of the photosensitive cells includes:

a photodiode (95) formed to be exposed on a surface of the semiconductor substrate, for accumulating signal charge obtained by subjecting incident light to photoelectric exchange;

a transfer transistor (96) formed on the semiconductor substrate, for transferring the signal charge accumulated in the photodiode;

a floating diffusion layer (91) formed on the semiconductor substrate, for temporarily accumulating the signal charge transferred by the transfer transistor;

an amplifier transistor (92) formed on the semiconductor substrate, for amplifying the signal charge temporarily accumulated in the floating diffusion layer,

wherein a source/drain diffusion layer (405) provided in the amplifier transistor is covered with a salicide layer (407).

Applicants' Admitted Prior Art of Figures 13-19 do not disclose the floating diffusion layer is formed to be exposed on the surface of the semiconductor substrate. However, Song et al. disclose a solid-state imaging apparatus comprising a transistor having a source/drain diffusion layer (120) covered with a salicide layer (135) and a floating diffusion layer (119) is formed to be exposed on the surface of a semiconductor substrate (101). Note Figures 4 and 11 of Song et al.. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the apparatus of the present invention having the floating diffusion layer is formed to be exposed on the surface of the semiconductor substrate, such as taught by Song et al. in order to prevent surface defects of the floating diffusion layer and thereby improve efficiency of the image sensor.

With regard to claim 5, Applicants' Admitted Prior Art of Figures 13-19 and Song et al. disclose the invention substantially as claimed including the apparatus as recited in the rejection above. Applicants' Admitted Prior Art of Figures 13-19 and Song do not disclose the transfer transistor and the amplifier transistor are composed of an n-type MOS transistor. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the transfer transistor and the amplifier transistor of Applicants' Admitted Prior Art of Figures 13-19 and Song et al. compose of an n-type MOS transistor in order to reduce the process time and to have a desired circuit performance.

With regard to claim 9, although Applicants' Admitted Prior Art of Figures 13-19 and Song et al. do not teach the impurity concentration of the floating diffusion layer, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the floating diffusion layer having a desired impurity concentration, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Allowable Subject Matter

5. Claims 2-4 and 6-8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is an examiner's statement of reasons for allowance:

Applicant's claims 2-4 and 6-8 are allowable over the references of record because none of these references disclose or can be combined to yield the claimed solid-state imaging apparatus having an impurity concentration of the floating diffusion layer is lower than an impurity concentration of the source/drain diffusion layer of the amplifier transistor, as recited in claim 2; an impurity concentration of the floating diffusion layer is lower than an impurity concentration of the source/drain diffusion layer provided in a plurality of transistors constituting the vertical driver circuit and the horizontal driver circuit, in combination with the remaining claimed limitations of claim 3.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (571) 272-1666. The examiner can normally be reached on Mon-Thurs 6:00-3:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The Central Fax Number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Vu

December 8, 2004

Hung Vu

Patent Examiner